CLAIMS

1. A gene recombination vector containing an expression cassette for enhancing photosynthesis activity, comprising a DNA fragment comprising a gene encoding a protein having FBPase and/or SBPase activities between a Rubisco large subunit gene and an acetyl CoA carboxylase subunit gene.

2. The vector as claimed in claim 1, wherein the protein having FBPase activity is any one of the followings;

(a) a protein comprising an amino acid sequence described in SEQ ID NO: 1 of Sequence Listing;

(b) a protein comprising an amino acid sequence in which one or several amino acids are deleted, substituted, added or inserted in SEQ ID NO: 1 of Sequence Listing, and having FBPase activity; and

(c) a protein having at least 60% or more homology to an amino acid sequence described in SEQ ID NO: 1 of Sequence Listing, and having FBPase activity.

3. The vector as claimed in claim 1, wherein the gene encoding a protein having FBPase activity is a gene comprising any one of the following DNAs;

(a) DNA comprising a nucleotide sequence described in SEQ ID NO: 2 of Sequence Listing;

(b) DNA comprising a nucleotide sequence in which one or several bases are deleted, substituted, added or inserted in SEQ ID NO: 2 of Sequence Listing, and encoding a protein having FBPase activity;

(c) DNA which hybridizes with DNA comprising a nucleotide sequence complementary to DNA comprising a nucleotide sequence described in SEQ ID NO: 2 of Sequence Listing under stringent conditions, and comprises a nucleotide sequence encoding a protein having FBPase activity; and

(d) DNA having at least 60% or more homology to DNA comprising a nucleotide sequence described in SEQ ID NO: 2 of Sequence Listing, and comprising a nucleotide sequence encoding a protein having FBPase activity.

4. The vector as claimed in claim 1, wherein the protein having SBPase activity is any one of the following proteins;

(a) a protein comprising an amino acid sequence described in SEQ ID NO: 3 of Sequence Listing;

(b) a protein comprising an amino acid sequence in which one or several amino acids are deleted, substituted, added or inserted in SEQ ID NO: 3 of Sequence Listing, and having SBPase activity; and

(c) a protein having at least 60% or more homology to an amino acid sequence described in SEQ ID NO: 3 of Sequence Listing, and having SBPase activity.

5. The vector as claimed in claim 1, wherein the gene encoding a protein having SBPase activity is a gene comprising any one of the following DNAs;

(a) DNA comprising a nucleotide sequence described in SEQ ID NO: 4 of Sequence Listing;

(b) DNA comprising a nucleotide sequence in which one or several bases are deleted, substituted, added or inserted in

SEQ ID NO: 4 of Sequence Listing, and encoding a protein having SBPase activity;

(c) DNA which hybridizes with DNA comprising a nucleotide sequence complementary to DNA comprising a nucleotide sequence described in SDQ ID NO: 4 of Sequence Listing under stringent conditions, and comprises a nucleotide sequence encoding a protein having SBPase activity; and

(d) DNA having at least 60% or more homology to DNA comprising a nucleotide sequence described in SDQ ID NO: 4 of Sequence Listing, and comprising a nucleotide sequence encoding a protein having SBPase activity.

6. The vector as claimed in claim 1, wherein the protein having FBPase and SBPase activities is any one of the followings:

(a) a protein comprising an amino acid sequence described in SEQ ID NO: 5 of Sequence Listing;

(b) a protein comprising an amino acid sequence in which one or several amino acids are deleted, substituted, added or inserted in SEQ ID NO: 5 of Sequence Listing; and having FBPase and SBPase activities; and

(c) a protein having at least 60% or more homology to an amino acid sequence described in SEQ ID NO: 5 of Sequence Listing; and having FBPase and SBPase activities.

7. The vector as claimed in claim 1, wherein the gene encoding a protein having FBPase and SBPase activities is a gene comprising any one of the following DNAs;

(a) DNA comprising a nucleotide sequence described in SEQ ID NO: 6 of Sequence Listing;

(b) DNA comprising a nucleotide sequence in which one or several bases are deleted, substituted, added or inserted in SEQ ID NO: 6 of Sequence Listing, and encoding a protein having FBPase and SBPase activities;

(c) DNA which hybridizes with DNA comprising nucleotide sequence complementary to a DNA comprising a nucleotide sequence described in SEQ ID NO: 6 of Sequence Listing under stringent conditions, and comprises a nucleotide sequence encoding a protein having FBPase and SBPase activities; and

(d) DNA having at least 60% or more homology to DNA comprising a nucleotide sequence described in SEQ ID NO: 6 of Sequence Listing, and comprising a nucleotide sequence encoding a protein having FBPase and SBPase activities.

8. The vector as claimed in any one of claims 1 to 7, wherein the expression cassette has a ribosome-binding site upstream of a translation initiation point of a DNA fragment comprising a gene encoding a protein having FBPase and/or SBPase activities.

9. The vector as claimed in claim 8, wherein the expression cassette has a promoter upstream of a ribosome-binding site, and a terminator downstream of DNA fragment comprising a gene encoding a protein having FBPase and/or SBPase activities.

10. The vector as claimed in claim 9, wherein the promoter and the terminator are a promoter and a terminator derived from tobacco chloroplasts, respectively.

11. The vector as claimed in any one of claims 1 to 10, wherein the Rubisco large subunit gene and the acetyl CoA carboxylase subunit gene are genes derived from tobacco, respectively.

12. A recombinant gene vector comprising an expression cassette containing a DNA fragment comprising a gene encoding a protein having FBPase and/or SBPase activities between a tobacco-derived Rubisco large subunit gene and an acetyl CoA carboxylase subunit gene, having a ribosome-binding site upstream of a translation initiation point of the DNA fragment, having a tobacco-derived promoter between a Rubisco large subunit gene and a ribosome-binding site, and having a tobacco-derived terminator between the acetyl CoA carboxylase subunit gene and the DNA fragment.

13. A transformed chloroplast characterized in that the vector according to any one of claims 1 to 12 is introduced into chloroplasts.

14. A plant containing transformed chloroplasts according to claim 13.

15. The plant as claimed in claim 14, wherein the plant is tobacco.

16. A plant having 2-fold or higher FBPase activity compared to the original one, characterized in that a FBP/SBP gene is introduced into chloroplast genome of higher plants and expressed using a chloroplast transformation technique.